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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 55.627		FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/EP 03/14335		International filing date (day/month/year) 16.12.2003	Priority date (day/month/year) 20.12.2002	
International Patent Classification (IPC) or national classification and IPC H04H1/00				
Applicant SONY INTERNATIONAL (EUROPE) GMBH ET AL.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 4 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in Item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 19.07.2004		Date of completion of this report 01.04.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Pantelakis, P Telephone No. +31 70 340-3526 		

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP 03/14335

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

2-11 as originally filed
1 received on 02.03.2005 with letter of 02.03.2005

Claims, Numbers

1-17 received on 02.03.2005 with letter of 02.03.2005

Drawings, Sheets

1/2-2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☒ the claims, Nos. 18-24
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP 03/14335

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-17
	No: Claims	
Inventive step (IS)	Yes: Claims	1-17
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP 03/14335

Prior art:

Document **EP0558918**, which represents the **closest prior art** with respect to the subject matter of **claim 1**, discloses a method for monitoring broadcast signals at alternative frequencies during the reception of a broadcast signal at a present frequency (c.3, l.42-52), comprising a step of instantaneously switching the receiver's gain from a present gain value corresponding to said present frequency to a second gain value corresponding to an alternative frequency whenever the broadcast signal at said alternative frequency is checked (c.4, l.5-10), whereby said second gain value is adapted to the supposed signal strength of the broadcast signal at said alternative frequency (c.2, l.28-36) and **differs** from the subject-matter of claim 1 in that both the broadcast signal received at said present frequency and the broadcast signal received at said alternative frequency are broadcast signals according to the DRM standard.

Statement of the problem:

The problem solved by the present invention is how to be able to monitor broadcast signals at alternative frequencies without noticeable interruption to the program the user is listening to.

Solution of the problem:

No prior art document present in the search report discloses or hints at utilising the method on a signal in which periodically no audio data is transmitted.

The amendment of the original claims has the effect that the documents EP0558918 and US5222254 that were cited as X and Y in the search report can no longer be considered as a basis for novelty or inventive step objections for claim 1.

Thus, the requirements of novelty (Art. 33 (2) PCT), inventive step (Art. 33 (3) PCT) and industrial applicability (Art. 33 (4) PCT) are all met for claim 1.

The same applies to the method dependent **claims 2-10**, to independent **claims 11 and 17** which define a receiver and a computer program product corresponding to the method of claim 1 and to the receiver dependent **claims 12-16**.

METHOD FOR MONITORING BROADCAST SIGNALS AT ALTERNATIVE FREQUENCIES AND GAIN CONTROL UNIT

5 The invention relates to a gain control unit, to a receiver and to a method for monitoring broadcast signals at alternative frequencies during the reception of a broadcast signal at a present frequency.

0 Many radio stations transmit their radio programs via a variety of different broadcast frequencies. When receiving a certain radio program at a present frequency, a receiver may at the same time monitor alternative frequencies, in order to compare the signal strength and the signal quality at said alternative frequencies to the reception conditions of the present frequency. In case the signal received at the present frequency is impaired by distortions, the receiver may switch to a different one of the variety of frequencies on which the respective
5 radio program is transmitted. Thus, the multitude of available frequencies guarantees a certain quality level of the received signal.

Switching from one received frequency to another frequency requires to readjust the gain of the receiver circuitry. Depending on the respective type of the
10 automatic gain control loop used in the receiver, the gain adjustment might take quite long. Depending on the design of the gain control loop, fast gain adjustments using short time constants lead to instabilities of the loop.

It is therefore an object of the invention to speed up the monitoring of broadcast
25 signals at alternative frequencies.

The object of the invention is solved by a method for monitoring broadcast signals at alternative frequencies according to claim 1 ~~/by a gain control unit according to /~~
~~/claim 14/~~ and by a receiver according to claim ¹¹~~15~~. Preferred embodiments thereof
30 are respectively defined in the following dependent sub-claims. A computer program product according to the present invention is defined in claim ¹⁷~~24~~.

According to the invention, broadcast signals at alternative frequencies are monitored during the reception of a broadcast signal at a present frequency.
35 Whenever the broadcast signal at an alternative frequency is checked, the receiver's gain is instantaneously switched from a present gain value corresponding to said present frequency to a second gain value corresponding to an alternative frequency, whereby the second gain value is adapted to the supposed signal strength of the broadcast signal at said alternative frequency.

40 In prior art solutions, the receiver's gain has been adjusted by means of the receiver's closed-loop control circuit. Especially in case the gain of the RF

New Claims

1. Method for monitoring broadcast signals at alternative frequencies during the reception of a broadcast signal at a present frequency,
- comprising a step of instantaneously switching the receiver's gain from a present gain value corresponding to said present frequency to a second gain value corresponding to an alternative frequency whenever the broadcast signal at said
5 alternative frequency is checked, whereby said second gain value is adapted to the supposed signal strength of the broadcast signal at said alternative frequency,
- wherein both the broadcast signal received at said present frequency and the broadcast signal received at said alternative frequency are broadcast signals
10 according to the DRM standard.
2. Method according to claim 1,
characterized by
a step of determining whether the program transmitted via the broadcast signal at
15 said alternative frequency is the same as the program transmitted via the broadcast signal at the present frequency.
3. Method according to any one of the preceding claims,
characterized by
20 a step of comparing the signal strength of the broadcast signal received at the alternative frequency to the signal strength of the broadcast signal received at the present frequency.
4. Method according to any one of the preceding claims,
25 **characterized in that**
in case the signal strength of the broadcast signal at the alternative frequency surpasses the signal strength of the signal at the present frequency by a predefined amount, and in case the programs transmitted at both frequencies are identical, the received frequency is switched from the present frequency to the alternative
30 frequency.
5. Method according to any one of the preceding claims,
characterized in that
35 alternative frequencies are monitored during time slots (18, 20, 22) of static data symbol transmission, whereby during a first time slot (18), the receiver's gain control circuit (13) settles to said second gain value, and whereby during a second

time slot (20) of static data symbol transmission, the receiver's gain is instantaneously switched to said second gain value.

6. Method according to any one of the preceding claims,
5 **characterized by**
a step of correlating said broadcast signal received at said present frequency and
said broadcast signal received at said alternative frequency.
7. Method according to any one of the preceding claims,
10 **characterized in that**
the second gain value is set to a predefined constant.
8. Method according to any one of preceding claims 1 to 6,
characterized in that
15 the second gain value is determined by reducing the present gain value by a
predefined constant.
9. Method according to any one of preceding claims 1 to 6,
characterized in that
20 the second gain value is determined by iteratively reducing the present gain value,
whereby in each step, the second gain value is reduced by a predefined constant.
10. Method according to any one of the preceding claims,
characterized in that
25 for each of a set of alternative frequencies, a corresponding gain value adapted to
the signal strength of the broadcast signal at said alternative frequency is stored.
11. Receiver comprising a gain control unit,
- wherein said gain control unit comprises gain switching means for
30 instantaneously switching the receiver's gain from a present gain value
corresponding to said present frequency to a second gain value corresponding to an
alternative frequency whenever the broadcast signal at said alternative frequency is
checked, whereby said second gain value is adapted to the supposed signal strength
of the broadcast signal at said alternative frequency, and
35 - wherein both the broadcast signal received at said present frequency and the
broadcast signal received at said alternative frequency are broadcast signals
according to the DRM standard.

12. Receiver according to claim 11,

characterized by

comparator means adapted for comparing the signal strength of the broadcast signal received at the alternative frequency to the signal strength of the broadcast signal received at the present frequency.

13. Receiver according to any one of the preceding claims 11 or 12,

characterized by

frequency switching means adapted for switching the received frequency from the present frequency to the alternative frequency in case the signal strength of the broadcast signal at the alternative frequency surpasses the signal strength of the signal at the present frequency, and in case the programs transmitted at both frequencies are identical.

14. Receiver according to any one of the preceding claims 11 to 13,

characterized in that

alternative frequencies are monitored during time slots (18, 20, 22) of static data symbol transmission, whereby during a first time slot (18), the receiver's gain control circuit settles to said second gain value, and whereby during a second time slot (20) of static data symbol transmission, the receiver's gain is instantaneously switched to said second gain value.

15. Receiver according to any one of the preceding claims 11 to 14,

characterized by

a correlator adapted for correlating said broadcast signal received at said present frequency and said broadcast signal received at said alternative frequency.

16. Receiver according to any one of the preceding claims 11 to 15,

characterized by

storage means adapted for storing, for each of a set of alternative frequencies, a corresponding gain value adapted to the signal strength of the broadcast signal at said alternative frequency.

17. Computer program product,

comprising computer program means adapted to perform the method steps as defined in any one of claims 1 to 10 when said computer program product is executed on a computer or digital signal processor.